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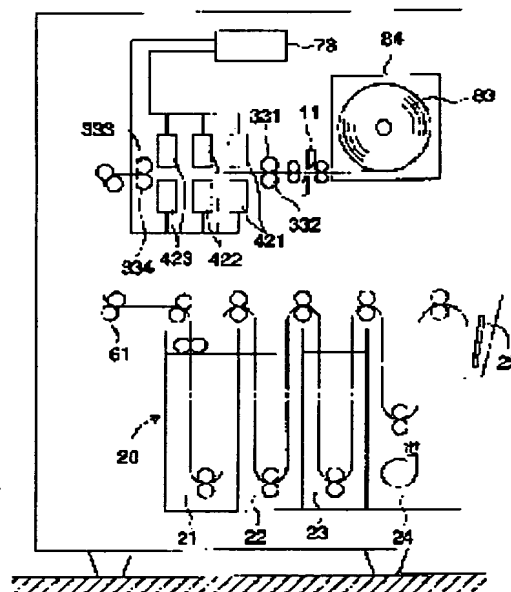
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(54) IMAGE RECORDING APPARATUS

(57)Abstract:

PURPOSE: To perform double-side recording within a short time by eliminating operation such that a recording material after the completion of the exposure of one surface thereof is reversed to be further exposed, in an image recording apparatus exposing a double-side photosensitive recording material imagewise to record an image, by providing at least one exposure means to each of the surfaces of the recording material.

CONSTITUTION: A roll-shaped double-side photosensitive recording material 83 is sent from a magazine 84 and cut into predetermined length in a cutter part 11. The recording material 83 after cutting is sent to an exposure part by a feed part containing rollers 331-334 and exposed while successively passed through the red, green and blue writing heads 421-423 of the writing means provided on both sides of the fed recording material 83. The recording material 83 is sent to a developing treatment part 20 and subjected to color development in a color developing tank 21 in order to visualize the latent image of the recording material 83 and the developed recording material is bleached and fixed in a bleaching and fixing tank 22 and stabilized in a stabilizing tank 23 and dried in a drying part 24.



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CLAIMS

[Claim(s)]

[Claim 1] In the image recording equipment which performs image recording by exposing into the double-sided photosensitivity record ingredient created by applying a photosensitive color picture record ingredient to both sides of the sheet-like base The exposure means exposed into said at least one double-sided photosensitivity record ingredient to each field of said double-sided photosensitivity record ingredient is established. This exposure means has the write-in means which writes image information in said double-sided photosensitivity record ingredient. Said two or more record components which are turned on and off by having the record component of the shape of an array of one train or two or more trains, or control light exposure this write-in means Image recording equipment characterized by carrying out exposure record of the color picture at said double-sided photosensitivity record ingredient which moves in the array direction and the direction of a right angle relatively to said double-sided photosensitivity record ingredient to this record component.

[Claim 2] Image recording equipment according to claim 1 characterized by having at least one record component of the shape of said array to one color for every page of said double-sided photosensitivity record ingredient.

[Claim 3] Said exposure means is what combined the back light with that to which it has the light source for writing, and this light source for writing made the shutter the light emitting diode, the fluorescent indicator tube, or the liquid crystal device, and image recording equipment according to claim 1 or 2 which comes out and is characterized by a certain thing.

[Claim 4] In the image recording equipment which performs image recording by exposing into the double-sided photosensitivity record ingredient created by applying a photosensitive color picture record ingredient to both sides of the sheet-like base As opposed to each side of said double-sided photosensitivity record ingredient At least one exposure means, A 1st write-in means by which prepare the transparence rotating drum holding said double-sided photosensitivity record ingredient, and said exposure means writes image information in said double-sided photosensitivity record ingredient from the inside side of said transparence rotating drum, Image recording equipment characterized by having the 2nd write-in means which writes an image in said double-sided photosensitivity record ingredient from the external surface side of said transparence rotating drum.

[Claim 5] Image recording equipment according to claim 4 characterized by to have a 2nd scan means to perform vertical scanning by moving relatively [direction / of a revolving shaft / of said transparence rotating drum] a 1st scan means to perform horizontal scanning by rotating relatively said 1st write-in means and said 2nd write-in means to the shaft of said transparence rotating drum, and said 1st write-in means and said 2nd write-in means.

[Claim 6] Image recording equipment according to claim 5 characterized by said 2nd scan means being a drum migration means to move said transparence rotating drum to the shaft orientations of this transparence rotating drum.

[Claim 7] In the image recording equipment which performs image recording by exposing into the double-sided photosensitivity record ingredient created by applying a photosensitive color picture record ingredient to both sides of the sheet-like base An exposure means to have the

write-in means which writes image information in said double-sided photosensitivity record ingredient exposed into said at least one double-sided photosensitivity record ingredient to each field of said double-sided photosensitivity record ingredient, and the light source for writing, Image recording equipment characterized by having the branching optical system which branches the beam of light from this light source for writing to two, and the catoptric system which leads each beam of light which branched according to this branching optical system to each field of said double-sided photosensitivity record ingredient.

[Claim 8] Image recording equipment according to claim 7 characterized by said exposure means having a polygon mirror or a galvanomirror.

[Claim 9] Image recording equipment of claim 1 to claim 8 characterized by performing different gradation transform processing for every field of said double-sided sensitization record ingredient given in any 1 term.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the image recording equipment which records an image on both sides of the double-sided photosensitivity record ingredient which has a coloring layer to both sides with high degree of accuracy in more detail with respect to image recording equipment.

[0002]

[Description of the Prior Art]

In <Prior-art 1> image recording equipment, the equipment which conveys an one side photosensitivity record ingredient in the direction of a right angle to the light emitting device arranged in the shape of an array, and is exposed into a record ingredient is known.

[0003] Moreover, in <Prior-art 2> image recording equipment, the equipment which holds an one side photosensitivity record ingredient to a rotating drum, and performs exposure from an external surface side, and the equipment which holds an one side photosensitivity record ingredient to the inside side of a drum, and is exposed using a rotation mirror are known.

[0004] The equipment which carries out horizontal scanning using a polygon mirror, a REZONANTO scanner, a GARUBANO scanner, etc. to an one side photosensitivity record ingredient, conveys and carries out vertical scanning in the direction of a right angle by whenever [fixed-speed], and furthermore forms a latent image in <Prior-art 3> image recording equipment is known. Moreover, the equipment which prepares the exposure section which used the polygon mirror etc. for the double-sided photosensitivity record ingredient independently of both sides, and forms a latent image is known (refer to JP,4-102629,A).

[0005]

[Problem(s) to be Solved by the Invention] However, in <Prior arts 1 and 2>, when forming and recording an image (latent image) on both sides of a double-sided photosensitivity record ingredient, it is necessary to perform one side [every] exposure, and the time amount which processing takes becomes long, and actuation becomes complicated.

[0006] Furthermore, when forming and recording an image (latent image) on both sides of a double-sided photosensitivity record ingredient in <Prior art 3>, it is necessary to expose by making a photosensitive record ingredient inside-out, it is inconvenient, and since the exposure section is separately prepared in each field when forming the image of a double-sided photosensitivity record ingredient, a large tooth space will be needed and it will become large as the whole equipment.

[0007] The image recording equipment which this invention was made in view of the above-mentioned technical problem, and is small into a double-sided photosensitivity record ingredient, and records image information on it by high definition. Moreover, the image recording equipment which records an image on a double-sided photosensitivity record ingredient by high definition, Moreover, it aims at offering the image recording equipment which records an image on a double-sided photosensitivity record ingredient with high precision by low cost, and the image recording equipment which can amend the concentration gradation difference of both sides of a double-sided photosensitivity record ingredient with each equipment of further the above.

[0008]

[Means for Solving the Problem] The above-mentioned purpose is attained by the following means. Namely, (A) 1st invention is set to the image recording equipment which performs image recording by exposing into the double-sided photosensitivity record ingredient created by applying a photosensitive color picture record ingredient to both sides of the sheet-like base. The exposure means exposed into said at least one double-sided photosensitivity record ingredient to each field of said double-sided photosensitivity record ingredient is established. This exposure means has the write-in means which writes image information in said double-sided photosensitivity record ingredient. Said two or more record components which are turned on and off by having the record component of the shape of an array of one train or two or more trains, or control light exposure this write-in means It is image recording equipment characterized by carrying out exposure record of the color picture at said double-sided photosensitivity record ingredient which moves in the array direction and the direction of a right angle relatively to said double-sided photosensitivity record ingredient to this record component. (B) In the image recording equipment which performs image recording by exposing into the double-sided photosensitivity record ingredient created when the 2nd invention applies a photosensitive color picture record ingredient to both sides of the sheet-like base At least one exposure means and the transparence rotating drum holding said double-sided photosensitivity record ingredient are prepared to each field of said double-sided photosensitivity ingredient. A 1st write-in means by which said exposure means writes image information in said double-sided photosensitivity record ingredient from said transparence rotating-drum inside side, It is image recording equipment characterized by having the 2nd write-in means which writes an image in said double-sided photosensitivity record ingredient from said transparence rotating-drum external surface. (C) In the image recording equipment which performs image recording by exposing into the double-sided photosensitivity record ingredient created when the 3rd invention applies a photosensitive color picture record ingredient to both sides of the sheet-like base An exposure means to have the write-in means which writes image information in said double-sided photosensitivity record ingredient exposed into said at least one double-sided photosensitivity record ingredient to each field of said double-sided photosensitivity record ingredient, and the light source for writing, It is image recording equipment characterized by having the branching optical system which branches the beam of light from this light source for writing to two, and the catoptric system which leads each beam of light which branched according to this branching optical system to each field of said double-sided photosensitivity record ingredient.

[0009] Furthermore, in claim 9, it is image recording equipment of the above (A) characterized by performing different gradation transform processing for every field of a double-sided sensitization record ingredient, (B), and the (C) term given in any 1 term.

[0010]

[Example] Hereafter, the image recording equipment concerning the example of the 1st invention, the 2nd invention, and the 3rd invention is explained based on a drawing.

[0011] <Example of the 1st invention> drawing 1 is the outline block diagram of the image recording equipment concerning the example of the 1st invention, and drawing 2 is the outline block diagram of the exposure means of drawing 1.

[0012] It is image recording equipment which writes the image of the color of two or more colors in coincidence with two or more write-in heads arranged in the shape of an array into the double-sided photosensitivity record ingredient. Here, when each configuration is explained, the double-sided photosensitivity record ingredient which is roll-like color printing paper is the roll-like double-sided photosensitivity record ingredient 83, and the double-sided photosensitivity record ingredient magazine 84 is a magazine which contains the roll-like double-sided photosensitivity record ingredient 83. The cutter section 11 is a device which cuts a double-sided photosensitivity record ingredient into predetermined die length. Moreover, the write-in head 421 for the red of a write-in means in the exposure section, the write-in head 422 for green, and the write-in head 423 for blue It is adjacently prepared in both sides of a double-sided photosensitivity record ingredient. In addition, in the example, as shown in drawing 2, the record component of each write-in head of a write-in means is arranged by two trains.

Moreover, the conveyance section is a roller 331, 332, 333, and 334. It is prepared, a roller 61 is further prepared for a proper place, and a double-sided photosensitivity record ingredient is conveyed. Moreover, in order that the development section 20 may visualize the latent image of a double-sided photosensitivity record ingredient, a development is carried out, and the color development is carried out by the color development tub 21, bleaching fixing is carried out by the bleaching fixing tub 22, and the development section 20 is stabilized by the stabilization tub 23, and is further dried by the dryer part 24. Moreover, on the discharge tray 25, the double-sided photosensitivity record ingredient by which the development was carried out is discharged outside, and is held.

[0013] Furthermore, a control section 73 is the electrical circuit block of image recording equipment, in this electrical circuit block, carried out signal processing of the image electrical signal from the outside to sequential control of image recording equipment and a pan, and has sent out the signal to the write-in head of a write-in means. It writes in as said signal processing by performing amendment of dispersion in each record component, gradation amendment of the double-sided photosensitivity record ingredient mentioned further later, etc., and is the write-in head 421,422,423 of a write-in means about a signal. It sends.

[0014] Here, when drawing 3 and 4 explain gradation amendment of the above-mentioned double-sided photosensitivity record ingredient, drawing 3 is the flow chart Fig. of the gradation amendment approach of a double-sided photosensitivity record ingredient, and drawing 4 is the explanatory view of gradation amendment of a double-sided photosensitivity record ingredient. The reappearance concentration-related target reappearance density curve (it is Curve c at drawing 4 (A)) of the double-sided photosensitivity record ingredient to the output signal of writing is set as the beginning (F01). Next, a wedge is exposed and developed using the look-up table of arbitration, for example, a straight line, and a sample is created (F02). Furthermore, the reflection density of said sample is measured and curvilinear 1a of drawing 4 (A) is created (F03). In addition, curvilinear 1a is one field of a double-sided photosensitivity record ingredient, and curvilinear 1b is the field of another side of a double-sided photosensitivity record ingredient. Next, curvilinear 1a is explained as a representative here. The output signal value of the point P1 of the arbitration of drawing 4 is set up (F04), and it is target reappearance concentration value ***** (F05) of the point P2 on the target reappearance density curve c at that time. Moreover, it asks for the concentration of the intersection P3 of curvilinear 1a equivalent to the same concentration as a target reappearance concentration value (F06). Furthermore, the output signal value (point P4) of a point P3 is calculated (F07). Here, the output signal value of a point P4 is assigned and amended to the output signal value of a point P1 (F08). F08 is repeated from the above-mentioned flow chart F04 by Hitoshi (F09). Furthermore, by performing interpolation processing of line type interpolation, spline interpolation, the Beziers interpolation, etc. to an intermediate output-signal value, as shown in drawing 4 (B), a look-up table is created (F10). In addition, curvilinear 2a of drawing 4 (B) is the conversion output signal of curvilinear 1a of drawing 4 R> 4 (A). Curvilinear 2b serves as a conversion output signal of curvilinear 1b of drawing 4 (A) similarly. Here, a look-up table is memorized in an amendment circuit (F11). This memorized look-up table performs gradation amendment by both sides of a double-sided photosensitivity record ingredient. In addition, the cause of the difference of a tone reproduction is mainly based on the difference in the stirring nature at the time of color development processing. Both sides of a double-sided photosensitivity record ingredient are reproduced by the above gradation amendments in the same gradation property. In addition, easy line type interpolation is [that there should just be the suitable number of data] sufficient as a look-up table. Moreover, the look-up table of drawing 4 is the example searched for by the write-in head shown in drawing 7 . If a look-up table amends, less than **0.02 tone reproductions will be acquired for the reappearance concentration value in both sides. In addition, when reflection density becomes 1.7 or more, it has become clear that it is difficult for people to observe through an experiment and to detect a concentration difference, and even if exact reappearance is not carried out like less than **0.02 in a concentration difference, there is especially no effect of image quality. Moreover, creation of a look-up table can output 28 steps of step wedge data which color to the same cyanogen, a Magenta, and yellow by both sides, can read them with a

scanner, and can be created automatically. In addition, although this drawing 4 used 28 steps of data, trouble does not have even about 15 steps of data, for example. Moreover, although density measurement used the scanner, it may measure every step by manual actuation for example, with a reflection density meter etc. by optimizing data spacing to sample. In addition, gradation amendment does not need to amend again, unless a difference is conspicuous, especially if it carries out once before performing the first write-in actuation in the usual case, if it is after warming-up of equipment finishes.

[0015] The double-sided photosensitivity record ingredient used for an example is used by the color NEGAPOJI system for general, applies a photosensitive color picture record ingredient, and makes a base side rival here on both sides of the protection-from-light paper which has suitable concentration. drawing 5 -- the relative sensibility Fig. of a double-sided photosensitivity record ingredient -- being shown -- an axis of ordinate -- relativity -- a logarithm -- it is sensibility and an axis of abscissa shows wavelength. Drawing shows the property of a blue sensitive layer, a green sensitive layer, and a red sensitive layer, respectively. In addition, this double-sided photosensitivity record ingredient is used also for the example of the 2nd below-mentioned invention and the 3rd invention.

[0016] Here, if an operation of the image recording equipment of an example is explained, the roll double-sided photosensitivity record ingredient 83 will be pulled out from the double-sided photosensitivity record ingredient magazine 84, and a double-sided photosensitivity record ingredient will be cut into the length predetermined in the cutter section 11. Furthermore, a double-sided photosensitivity record ingredient is the roller 331,332 and roller which counter. Conveying by 333,334, based on the image electrical signal from the outside, various kinds of signal processing is performed with the write-in head 421,422,423 of a write-in means, it writes in with the record component of the shape of two or more array, and a latent image is acquired. When it explains in more detail, in a control circuit 73, the image electrical signal sent from the outside is mapped by the data of 4096 concentration level by the gradation conversion circuit which an image electrical signal does not illustrate with 256 steps of gradation. In the multiplier which was changed into the amount data of luminescence expressed with the driver for control which the record component of the write-in head of a write-in means does not illustrate by the luminescence time amount of each record component, and performed the normalization by making the average value of the amount of luminescence of each record component into a reference value, a division is done from the data of a whole page and amendment of dispersion between each record component is made. In addition, although amended by normalizing on the basis of the average of light exposure here, since fluctuation is large, it is desirable [the minimum value and maximum] to carry out to the average and specific desired value. After [which set up the correction value between record components so that it might write in and a head might become the same exposure reinforcement] letting a look-up table which becomes the same light exposure to the same input signal at both each photosensitive record ingredient by 1 to 1 pass and having been arranged at the double-sided photosensitivity record ingredient, the further above-mentioned gradation amendment is performed and the above-mentioned writing is performed. Then, a double-sided photosensitivity record ingredient is developed by the color development tub 21 in the development section 20, bleaching fixing is carried out by the bleaching fixing tub 22, and it stabilizes by the stabilization tub 23, and dries by the dryer part 24 further. Then, it discharges on the external tray 25.

[0017] Next, intermediary drawing 6 explains to the image recording equipment concerning other examples of the 1st invention. In addition, while giving the same sign to the same member as the equipment explained in the above-mentioned example in image recording equipment, the explanation is omitted about what does not change configuration-wise and functionally.

[0018] Drawing 6 is the outline block diagram of the exposure means concerning other examples. Drawing 6 (A) arranges the red of a write-in means, and the write-in green and blue head 407,408,409 into the double-sided photosensitivity record ingredient 801. back lights 488a, 488b, and 488c of each color, such as the light source for writing of an exposure means, for example, a light emitting diode, and electroluminescence devices, from -- the light which carried out outgoing radiation -- the liquid crystal shutter 489 -- minding -- the rod-lens array 485 --

mindings — double-sided photosensitivity record ingredient 801 It writes in the sensitization side 81 and the sensitization side 82. Moreover, drawing 6 (B) is what has arranged the write-in head 424,425,426 of three colors of a write-in means, and uses the fluorescent indicator tube for the double-sided photosensitivity record ingredient 801 as the light source for writing. The light which carried out outgoing radiation is written in by the field of the double-sided photosensitivity record ingredient 801 through the yellow filter 486, the blue filter 487, and the red filter 489 through the rod-lens array 485 from a fluorescent indicator tube 481. In addition, although it becomes the problem which produces heterogeneity to the concentration reproduced by the double-sided photosensitivity record ingredient since dispersion is in the amount of luminescence for every record component by each array when writing in a photosensitive record ingredient, using such an array as the light source for writing of an exposure means By amending so that it may become target gradation based on the concentration of each step which scanned the sample which performed the concentration output the amount data of luminescence measured in advance, and once using microdensitometer or a scanner, and was obtained, light exposure is amended for every record component. In addition, when taking out a strict precision, if it is the error of less than 2% of concentration, it will not become a serious failure for appearance, but it is still better if it presses down to less than 1% of concentration still more preferably. Being able to write a good image now in both sides of a double-sided photosensitivity record ingredient with the write-in head of a write-in means by the above, an exposure means becomes compact further.

[0019] Furthermore, drawing 7 is the outline block diagram of the exposure means concerning other examples. It is what has arranged the write-in head 401,402,403 of three colors of a write-in means into the double-sided photosensitivity record ingredient 801, and the write-in head 401 of an exposure means is LED array 482 with a dominant wavelength of 660nm as the light source for writing at the object for red component image recording. The rod-lens array 485 is put together. Moreover, the write-in head 402 is the vacuum fluorescence tubing array 484 which has part luminous-radiation energy distribution like drawing 4 which is an object for green component image recording, and is mentioned later. The rod-lens array 485 and yellow filter 486 It is constituted. Furthermore, the write-in head 403 is the vacuum fluorescence tubing array 484 which has part luminous-radiation energy distribution like drawing 4 which is an object for blue component image recording, and is mentioned later. Blue filter 487 the rod-lens array 485 and for color separation It is constituted. As for selection of such part light energies, it is desirable to use a thing so that any spectral sensitivity other than the color made into the purpose of a double-sided photosensitivity record ingredient may not be started. In addition, since sensibility differs greatly for every coloring layer of color printing paper and latent-image formation is not carried out in a red coloring layer as a green object for record components as drawing 5 explained, it is possible to use as a green object for record exposure. In addition, although arranging face to face is advantageous to the same location on a space tooth space as for the write-in head of a write-in means, you may prepare in a separate location (see drawing 16). . Moreover, if it writes in by fixing and writing in a double-sided photosensitivity record ingredient, and moving the head, a vertical vibration will be pressed down to the conveyance direction of the double-sided photosensitivity record ingredient at the time of conveyance, and the instability of the feed rate by slipping accompanying friction between the roller at the time of roller conveyance and a double-sided photosensitivity record ingredient etc. can be prevented. Moreover, when writing in a large image, several write-in array-like heads are combined.

[0020] Here, drawing 8 shows the property Fig. of a vacuum fluorescence tubing array, and the property Fig. of the filter for color-separation amendment. It is what was used for the write-in head of an above-mentioned write-in means, the axis of ordinate of the property Fig. of a vacuum fluorescence tubing array is radiant energy, an axis of abscissa shows wavelength, and it is the vacuum fluorescence tubing array 484. The property is shown. Moreover, at filter permeability, the property Fig. of the filter for color-separation amendment shows wavelength, and an axis of ordinate is [an axis of abscissa] the yellow filter 486. Blue filter 487 The property is shown.

[0021] <Example of the 2nd invention> drawing 9 is the outline block diagram of the image

recording equipment concerning the example of the 2nd invention, and drawing 10 R> 0 is the outline block diagram of the exposure section of drawing 9. In addition, in this example, the same per explanation is abbreviated to the example of the 1st invention configuration-wise and functionally about gradation amendment. Here, when intermediary explanation is given at each configuration, it is the double-sided photosensitivity record ingredient 801. For example, it is the double-sided photosensitivity record ingredient of roll-like color printing paper. The double-sided photosensitivity record ingredient magazine 84 is a magazine with which the double-sided photosensitivity record ingredient was contained. Moreover, a cutter 11 cuts a double-sided photosensitivity record ingredient into predetermined die length. Moreover, the 1st write-in means 542 of an exposure means The 2nd write-in means 541 It writes in by sharing the light source 73 for writing. Green [which were carried out in quantity of light stabilizing treatment / the red and green], and the light from each blue laser 431,432,433 penetrate the abbreviation one half of a beam by the translucent mirror 511 of branching optical system, and branch to two optical paths by reflecting the remainder. Moreover, the sound modulation element 531 changes the quantity of light, and is adjusting light exposure. In said sound modulation element 531, gradation amendment is performed by the approach same with having been shown in the example of the 1st invention. Each light which had the quantity of light adjusted is compounded by one light by the mirror 501 and the translucent mirror 511 here. Reflect with the reflected light study block 542 of the 1st write-in means, it is condensed with the image formation lens 533, and one is exposed by the double-sided photosensitivity record ingredient 801. It reflects with the reflected light study block 541 of the 2nd write-in means, is condensed with the image formation lens 533, and other one is exposed by the double-sided photosensitivity record ingredient 801. Motor 492 A gearing 498 and 495 It minds and is the transparence rotating drum 304. It rotates. Moreover, transparence rotating drum 304 A double-sided photosensitivity record ingredient is held with the rotating drum of transparence. Moreover, rotary encoder 490 The pulse according to an angle of rotation is outputted, and it exposes in the right location of a double-sided photosensitivity record ingredient synchronizing with the pulse. Moreover, the conveyance section is a roller 603 to a proper place. It is prepared, a double-sided photosensitivity record ingredient is written in, and it conveys to the section and the development section. Base material 353 The reflected light study block 541 and 542 are moved in the direction of a right angle with a sufficient precision by the jogging member 37 to the hand of cut of a transparence rotating drum. Moreover, a development is carried out, the color development is carried out to the development section 20 by the color development tub 21, bleaching fixing is carried out by the bleaching fixing tub 22, and the development section 20 is stabilized by the stabilization tub 23, and is dried by the dryer part 24. On the discharge tray 25, the developed double-sided photosensitivity record ingredient is discharged outside, and is held. A control section 73 is the electrical circuit block of image recording equipment, it writes in by performing gradation amendment which carried out signal processing of the image electrical signal from the outside, and mentioned it above and which was explained in the example of the 1st invention, writes in a signal, and sends it to a head.

[0022] Here, if an operation of the image recording equipment of an example is explained, a double-sided photosensitivity record ingredient will be pulled out from the double-sided photosensitivity record ingredient magazine 84, and it will cut into predetermined die length in the cutter section 11. A double-sided photosensitivity record ingredient is the roller 603 which counters. It is conveyed. A double-sided photosensitivity record ingredient is coiled and fixed on the transparence rotating drum 304. Next, transparence rotating drum 304 It rotates and is the 1st scan means 492. Horizontal scanning is carried out. Moreover, vertical scanning of the reflected light study block is moved and carried out by the jogging member 37 which is the 2nd scan means, and a latent image is acquired. Then, a double-sided photosensitivity record ingredient is the roller 640 which was stripped with the transparence rotating drum and prepared for the proper place. It conveys in the development section 20. The color development of the double-sided photosensitivity record ingredient is carried out by the color development tub 21 in the development section 20, bleaching fixing is carried out by the bleaching fixing tub 22, and it stabilizes by the stabilization tub 23, and dries by the dryer part 24 further. Furthermore, it is

discharged by the external tray. Since a double-sided photosensitivity record ingredient is twisted around a transparence rotating drum by the above, it becomes high resolution by a focus side being stabilized and adjusting the passing speed of vertical scanning, and the modulation rate of a sound modulation element further. In addition, the wavelength sensing element of semiconductor laser may be combined with the semiconductor laser other than gas laser like helium neon or an argon as the laser light source. By sharing the light source in a write-in part, the double-sided record image of high quality is obtained by power saving and low cost. In addition, image formation lens 533 of the 1st write-in means and the 2nd write-in means You may be before the reflected light study block 541,542. In addition, although a head may be moved and you may stop for every horizontal scanning of the 1st scan means, it is difficult to maintain location precision from the relation of a mechanical machining precision, and since the error of such a location appears as concentration unevenness in many cases, it is desirable [exposing] to use the helical scan which moves a head.

[0023] Furthermore, the image processing system concerning other examples of the 2nd invention is explained. in addition -- while giving the same sign to the same member as the equipment explained in the above-mentioned example -- a configuration ---like --- functional --- not changing, either -- it is alike, it attaches and the explanation is omitted.

[0024] Drawing 11 is the outline block diagram of the exposure section concerning other examples. double-sided photosensitivity record ingredient 801 it is -- color printing paper is twisted with a precision sufficient to the transparence rotating drum 303, and is held. Moreover, the write-in head 427 of the 1st write-in means and the write-in head 428 of the 2nd write-in means are held at a base material 352, and the base material 352 is being fixed to the body. In addition, it is fixed to a body 10 and the bearing 32 is the bearing of a shaft 361. Moreover, motor 493 It is made rotation and he is a gearing 496,495. It minds and is the transparence rotating drum 303. It rotates. In addition, rotary encoder 490 A gearing 495 and 497 It minds, and it rotates and the rotation location of a transparence rotating drum is detected. Moreover, ball screw motor 494 It rotates and the precision is made to carry out straight-line migration of the ball thread 34. This ball screw 34 moves the table 12 on which it moved to the precision and the transparence rotating drum was placed to the shaft of a transparence rotating drum, and parallel. Furthermore, a control circuit 73 is the electrical circuit block of image recording equipment, in this electrical circuit block, it carried out signal processing of the image electrical signal to sequential control of image recording equipment and a pan, wrote it in them, and has sent out the signal to the head. It writes in as said signal processing by performing amendment of dispersion in each record component, gradation amendment of the further above-mentioned double-sided photosensitivity record ingredient, etc., and the signal is taken out.

[0025] Here, when an operation of the image recording equipment of an example is explained, it is the motor 493 of the 1st scan means. Transparence rotating drum 303 It rotates and is the write-in head 427 of three colors, and 428. Horizontal scanning is performed and it is the ball screw motor 494 of the 2nd scan means further. By rotation, with a ball screw 34, a table 12 is made to move slightly, vertical scanning is carried out, and a two-dimensional latent image is acquired. An image is recordable with a sufficient precision with the above.

[0026] Moreover, if the outline configuration of the exposure section concerning other examples is explained, drawing 12 is the outline block diagram of the exposure section concerning other examples, and the color printing paper of the double-sided photosensitivity record ingredient 801 will be twisted around the transparence rotating drum 302 with a sufficient precision, and will be held. Moreover, a motor 491 rotates the transparence rotating drum 302 through a gearing 495,496. Moreover, the write-in head 417 of the 1st write-in means and the write-in head 418 of the 2nd write-in means are held at the base material 351. This base material 351 is the shaft 362 of the transparence rotating drum 302 by rotation of a motor. Precision migration is carried out in parallel. In addition, it is fixed to a body 10 and the bearing 32 is the bearing of a shaft 362.

[0027] When an operation of the image recording equipment of an example is explained here, as drawing 11 explained, it is the write-in head 418 and 417. Transparence rotating drum 302 It rotates relatively, and horizontal scanning is carried out, and vertical scanning is performed by migration of a base material, and a two-dimensional image is obtained. It is recordable with a

sufficient precision with the above.

[0028] furthermore, outline **** of the exposure section concerning other examples — if it ***** just, drawing 13 is the outline block diagram of the exposure section concerning other examples, and he writes the write-in head 412 in the sensitization side 81 of a double-sided photosensitivity record ingredient, and is trying to write the write-in head 411 of another side in the sensitization side 82 of a double-sided photosensitivity record ingredient. The write-in head 412 of the 2nd write-in means takes out the beam of light of the blue color and Green color with the LED light emitting device 471, and takes out the beam of light of a red color with the LED light emitting device 472. Moreover, a sensitization side is made to carry out image formation of each beam of light with a lens 461. It is similarly attached about the write-in head 411 of the 1st write-in means, the same sign is attached, and explanation is omitted. It is attached in a position with a sufficient precision, and each write-in head is the double-sided photosensitivity record ingredient 801. Transparence rotating drum 301 Three colors are written in coincidence by the write-in head from a medial surface and the lateral surface, respectively. With the 1st scan means, it rotates relatively, and horizontal scanning of the write-in head 411, and 412 and the transparence rotating drum 301 is carried out, and it is the transparence rotating drum 301. It writes in, a head 411 and 412 are displaced relatively with the 2nd scan means to the shaft orientations of the transparence rotating drum 301, vertical scanning is performed, and a two-dimensional image is obtained. The double-sided photosensitivity record ingredient 301 coils around a transparence rotating drum by the above, the focus side of a double-sided photosensitivity record ingredient is stabilized, and a latent image can be formed.

[0029] Using such optical system, it is possible to make the concentration difference of a double-sided photosensitivity record ingredient or less into ± 0.02 , and the side stuck to the transparent body can amend that sharp nature deteriorates by dispersion with the transparent body etc. by changing amendment of sharp nature with each exposure means in both sides of a double-sided photosensitivity record ingredient. In addition, if it exposes by the light source by laser, such as helium neon, an argon, and a semi-conductor, as a write-in unit, a pitch can be made fine and a high definition image will be obtained.

[0030] <Example of the 3rd invention> drawing 14 is the outline block diagram of the image recording equipment concerning the example of the 3rd invention. In addition. In this example, the development section is identically attached in configuration with drawing 1, and explanation is omitted. About gradation amendment, the same per explanation is abbreviated to the example of the 1st invention configuration-wise and functionally.

[0031] Here, explanation of each configuration polarizes the laser beam which carried out outgoing radiation from the semiconductor laser 431 of the light source for writing of an exposure means by the polygon mirror 441 rotated by the motor 445 through the beam expander 58 of a write-in means. The parallel flux of light of the constant angular velocity in the first half of this polarization serves as focusing spot light of Constant Linear Velocity through the ftheta lens 571 and a mirror 502, and horizontal scanning of it is carried out and it is written in one field of the double-sided photosensitivity record ingredient 801. The parallel flux of light of the constant angular velocity of the second half which polarized by the polygon mirror 441 similarly serves as focusing spot light of Constant Linear Velocity through the ftheta lens 572 and a mirror 503, and horizontal scanning of it is carried out and it is written in the field of another side of a double-sided photosensitivity record ingredient. Moreover, the double-sided photosensitivity record ingredient 801 is conveyed with a roller 601,602, and vertical scanning is carried out.

[0032] Here, if an operation of an example is explained, the double-sided photosensitivity record ingredient 801 is written in with rollers 601 and 602, and is conveyed to the section, the beam of light from the light source for writing will be branched to both sides of the double-sided photosensitivity record ingredient 801 two, and writing will be performed to coincidence by the write-in means. The laser beam which carried out outgoing radiation rotates said write-in means by the motor 445 through the beam expander 58 from one semiconductor laser 431. It polarizes by the poly GONN mirror 441, and the parallel flux of light of the constant angular velocity in the first half of polarization serves as focusing spot light of Constant Linear Velocity through the mirror 502 of the ftheta lens 571 and catoptric system, and horizontal scanning of it is carried

out and it is written in one field of the double-sided photosensitivity record ingredient 801. Moreover, through the ftheta lens 572 and a mirror 503, it becomes the focusing spot light of Constant Linear Velocity, horizontal scanning is carried out, and the parallel flux of light of the constant angular velocity of the second half which polarized by the polygon mirror 441 similarly is the double-sided photosensitivity record ingredient 801. It is written in the field of another side. Moreover, the double-sided photosensitivity record ingredient 801 is conveyed with a roller 601,602, carries out vertical scanning, and obtains a two-dimensional image. Then, a double-sided photosensitivity record ingredient is visualized by carrying out a development in the development section like above-mentioned drawing 1, and is discharged outside. In addition, it is good as for 1 set in the mirror 502,503 of the ftheta lens 571,572 and catoptric system. Moreover, if it writes in by the light source by laser, such as helium neon and an argon semiconductor, a pitch can be made fine and it will become high definition in respect of sharp nature or resolution. As mentioned above, most is sharing 2 sets of write-in means, and they can achieve a miniaturization and low cost-ization.

[0033] Furthermore, the image recording equipment concerning other examples of the 3rd invention is explained. in addition -- while giving the same sign to the same member as the equipment explained in the above-mentioned example -- a configuration ---like -- functional -- not changing, either -- it is alike, it attaches and the explanation is omitted.

[0034] Drawing 15 is the outline block diagram of the exposure section concerning other examples. Here, if an intermediary is explained to each configuration, in the light from the semiconductor laser 434 of the Green color of the light source for writing, the light of the semiconductor laser 435 of a blue color is the business to which the light of the semiconductor laser 436 of a red color irradiates a galvanomirror 451 through a lens 463 and the translucent mirror 513, respectively further through the lens 463 and the translucent mirror 513 through the lens 463 and the mirror 504. Moreover, a galvanomirror 451 polarizes and carries out horizontal scanning of the compound light. It reflects by the mirror 522 of catoptric system through the ftheta lens 573, and writes in one field of the double-sided photosensitivity record ingredient 801 with a write-in means the first half of horizontal scanning. Moreover, the ftheta lens 573 is reflected by the mirror 521 of through and catoptric system, and it is written in the field of another side of the double-sided photosensitivity record ingredient 801 by the write-in means the second half of horizontal scanning.

[0035] Here, if an operation of the equipment of an example is explained, through a lens 463 and a mirror 504, through a lens 463 and the translucent mirror 513, further, the light of the semiconductor laser 436 of a red color will be compounded by three colors through a lens 463 and the translucent mirror 513, and the light from the semiconductor laser 434 of the Green color of the light source for writing will irradiate a galvanomirror 451 in the light of the semiconductor laser 435 of a blue color. Horizontal scanning is polarized and carried out in a galvanomirror 451. It reflects by the mirror 522 through the ftheta lens 573, and is written in one field of the double-sided photosensitivity record ingredient 801 the first half of horizontal scanning. Moreover, the ftheta lens 573 is reflected by the through mirror 521, and horizontal scanning is carried out to the field of another side of the double-sided photosensitivity record ingredient 801, and it is written in it the second half of horizontal scanning. Furthermore, vertical scanning of the double-sided photosensitivity record ingredient 801 is conveyed and carried out to a cross direction to the space of a drawing, and it obtains a two-dimensional image. In addition, even if Green and blue semiconductor laser combine with a wavelength sensing element, they are possible. More than carries out long ago, most write-in means are shared, and a miniaturization and low cost-ization can be achieved.

[0036] In addition, an error can be prevented by establishing a means to perform each justification which takes place from the field of the chromatic aberration of a deviation lens system, or using special achromatism optical system.

[0037] Moreover, although protection-from-light nature of a photosensitive record ingredient can be made thin unless an opposite field exposes Concentration reappearance may be performed in the direction deeper than the concentration expected since the light exposure predicted in respect of opposite increased if a latent sub-image is formed in respect of being opposite of

protection-from-light nature and it remains as it is. In such a case, it is restricting in the part of the light exposure which increased the light exposure of the point of an opposite side of having performed strong exposure, and the direction expected and reduced, and it is possible to amend the phenomenon by which concentration reappearance is carried out deeply. In addition, it can say also about the 1st invention and the 2nd invention.

[0038] If it is in the equipment written in large size etc., when connecting two or more write-in heads, the clearance which will be written in if it is made to overlap stops in addition, occurring in the example of the 1st invention and the 2nd invention.

[0039] Furthermore, when the image recording equipment concerning other examples of the 1st invention is explained further, drawing 16 is the outline block diagram of the image recording equipment concerning other examples, the double-sided photosensitivity record ingredient 801 is pulled out from the double-sided photosensitivity record ingredient magazine 84, and it is a roller 603. It conveys and is a drum 605. Write-in head 415 of three colors of the write-in means formed in near It writes in. It is conveyed further and a double-sided photosensitivity record ingredient is the write-in head 416. It is written in the field of another side of a photosensitive record ingredient. In addition, the initiation stage of two write-in heads is adjusted timely, and doubles a double-sided write-in location with a desired location. Then, a double-sided photosensitivity record ingredient is a roller 604. It is conveyed and goes into the development section 20. In the development section 20, the color development is carried out by the color development tub 21, bleaching fixing is carried out by the bleaching fixing tub 22, and it stabilizes by the stabilization tub 23, it dries by the dryer part 24, and is discharged by the tray. An image is recorded on coincidence by the double-sided photosensitivity record ingredient by the above.

[0040]

[Effect of the Invention] Since it constituted as mentioned above, the following effectiveness is done so.

[0041] According to the image recording equipment of the 1st invention, since at least one exposure means was established to each field, reversal actuation of the double-sided photosensitivity record ingredient can be carried out after a sheet of exposure termination, it is not necessary to expose the whole surface further any longer, and double-sided image recording can be simply acquired with small equipment in a short time. 1 [moreover,] every field -- 1 a color -- receiving -- 1 **** -- according to the property of a photosensitive record ingredient, a record component can be chosen for every color by lower one, and quick processing can be performed. Moreover, it is possible to record an image on a high speed according to the light source for writing of the optimal spectral energy distribution to a photosensitive record ingredient.

[0042] Moreover, according to the image recording equipment of the 2nd invention, location precision is good, with the transparence rotating drum with which high definition is obtained in respect of resolution, double-sided coincidence record can be performed and double-sided image recording is made for a short time. Moreover, since it writes in with a transparence rotating drum, and it rotates relatively, horizontal scanning of the means is carried out and vertical scanning is further displaced relatively and carried out to shaft orientations, the migration load of equipment can be made small and image quality is stabilized further. Moreover, since vertical scanning of the transparence rotating drum is moved and carried out to shaft orientations, the migration load of equipment can be made small and a high definition image without the effect of vibration by the write-in means is obtained further.

[0043] Moreover, according to the image recording equipment of the 3rd invention, since the one light source for writing is branched, a cost cut can be aimed at and small equipment with small power consumption is obtained. Since it has a polygon mirror and a galvanomirror, a high resolution double-sided image is obtained by the easy approach for a short time, and, moreover, it becomes low cost.

[0044] Furthermore, since gradation transform processing which is different by the above invention [1st], the 2nd invention, and the 3rd invention amends the difference in both sides, an output image with the same gradation property is obtained by both sides. For example, the development difference in both sides in development can be amended.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the outline block diagram of the image recording equipment concerning the example of the 1st invention.

[Drawing 2] It is the outline block diagram of the exposure means of drawing 1 .

[Drawing 3] Drawing 3 is the flow chart Fig. of the gradation amendment approach of a double-sided photosensitivity record ingredient.

[Drawing 4] Drawing 4 is the explanatory view of gradation amendment of a double-sided photosensitivity record ingredient.

[Drawing 5] It is the relative sensibility Fig. of color printing paper.

[Drawing 6] It is the outline block diagram of the exposure means concerning other examples.

[Drawing 7] It is the outline block diagram of the exposure means concerning other examples.

[Drawing 8] They are the property Fig. of a vacuum fluorescence tubing array, and the property Fig. of the filter for color-separation amendment.

[Drawing 9] It is the outline block diagram of the image recording equipment concerning the example of the 2nd invention.

[Drawing 10] It is the outline block diagram of the exposure section of drawing 9 .

[Drawing 11] It is the outline block diagram of the exposure section concerning other examples.

[Drawing 12] It is the outline block diagram of the exposure section concerning other examples.

[Drawing 13] It is the outline block diagram of the exposure section concerning other examples.

[Drawing 14] It is the outline block diagram of the image recording equipment concerning the example of the 3rd invention.

[Drawing 15] It is the outline block diagram of the exposure section concerning other examples.

[Drawing 16] It is the outline block diagram of the image recording equipment concerning other examples.

[Description of Notations]

10 Body

11 Cutter Section

12 Table

20 Development Section

21 Color Development Tub

22 Bleaching Fixing Tub

23 Stabilization Tub

24 Dryer Part

25 Tray

302,303,304 Transparence rotating drum

32 Bearing

331,332,333,334 Roller

34 Ball Screw

351,352,353 Base material

361,362 Shaft

37 Jogging Member

401, 402, 403,407,408,409 Write-in head
411, 412, 415,416,417,418 Write-in head
421, 422, 423, 424, 425,426,427,428 Write-in head
431, 432, 433,434,435,436 Semiconductor laser
441 Polygon Mirror
445 Motor
451 Galvanomirror
461,463 Lens
471,472 Light emitting device
481 Fluorescent Indicator Tube
482 LED Array
484 Vacuum Fluorescence Tubing Array
485 Rod-Lens Array
486 Yellow Filter
487 Blue Filter
488a, 488b, 488c Back light
489 Liquid Crystal Shutter
490 Rotary Encoder
491,492,493 Motor
494 Ball Screw Motor
495,496,497,498 Gearing
499 Red Filter
501,502,503,504 Mirror
511,513 Translucent mirror
521,522 Mirror
531 Sound Modulation Element
533 Image Formation Lens
541,542 Reflected light study block
571,572,573 f theta lens
58 Beam Expander
601, 602, 603,604,605,606 Roller
61 63 Roller
73 Control Circuit
801 Double-sided Photosensitivity Record Ingredient
81 82 Sensitization side
83 Roll-like Double-sided Photosensitivity Record Ingredient
84 Double-sided Photosensitivity Record Ingredient Magazine

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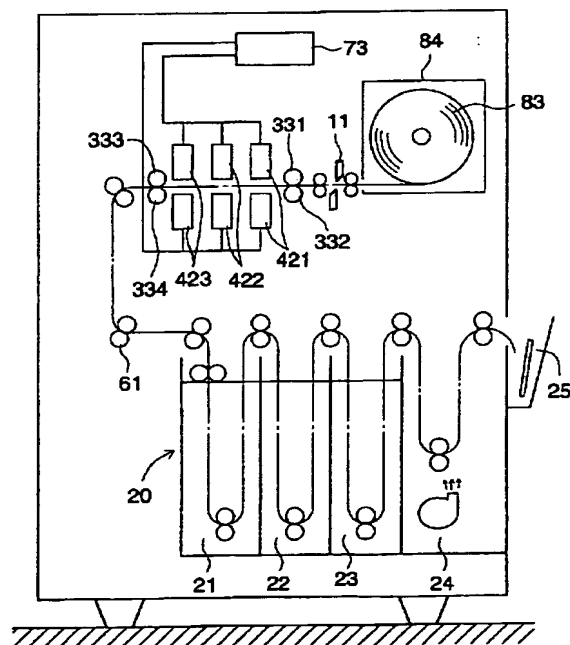
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(54) 【発明の名称】 画像記録装置

(57) 【要約】

【目的】 両面感光性の感光材料に画像を小型で高精度に記録する画像記録装置を提供する。

【構成】 シート状のベースの両面に感光性カラー画像記録材料を塗布することにより作成される両面感光性記録材料に露光を行うことにより画像記録を行う画像記録装置において、前記両面感光性記録材料の各面に対して少なくとも1つの前記両面感光性記録材料に露光を行う露光手段を設け、該露光手段は前記両面感光性記録材料に画像情報を書き込む書込手段を有し、該書込手段は1列又は複数列のアレイ状の記録素子を有し、オン・オフ可能、又は露光量の制御を行う複数の前記記録素子が、該記録素子に対して配列方向と直角方向に前記両面感光性記録材料に対して相対的に移動する前記両面感光性記録材料にカラー画像を露光記録することを特徴とする画像形成装置である。



【特許請求の範囲】

【請求項 1】 シート状のベースの両面に感光性カラー画像記録材料を塗布することにより作成される両面感光性記録材料に露光を行うことにより画像記録を行う画像記録装置において、前記両面感光性記録材料の各面に対して少なくとも 1 つの前記両面感光性記録材料に露光を行う露光手段を設け、

該露光手段は前記両面感光性記録材料に画像情報を書き込む書込手段を有し、
該書込手段は 1 列又は複数列のアレイ状の記録素子を有し、オン・オフを行う、又は露光量の制御を行う複数の前記記録素子が、該記録素子に対して配列方向と直角方向に前記両面感光性記録材料に対して相対的に移動する前記両面感光性記録材料にカラー画像を露光記録することを特徴とする画像記録装置。

【請求項 2】 前記両面感光性記録材料の 1 面毎に、前記アレイ状の記録素子を 1 色に対して少なくとも 1 本有することを特徴とする請求項 1 記載の画像記録装置。

【請求項 3】 前記露光手段は書き込み用光源を有し、該書き込み用光源が発光ダイオード、蛍光表示管、又は液晶素子をシャッタとしたものにバックライトを組み合わせたもの、であることを特徴とする請求項 1 または 2 に記載の画像記録装置。

【請求項 4】 シート状のベースの両面に感光性カラー画像記録材料を塗布することにより作成される両面感光性記録材料に露光を行うことにより画像記録を行う画像記録装置において、
前記両面感光性記録材料の各面に対し少なくとも 1 つの露光手段と、
前記両面感光性記録材料を保持する透明回転ドラムとを設け、前記露光手段が前記透明回転ドラムの内面側から前記両面感光性記録材料に画像情報を書き込む第 1 書込手段と、前記透明回転ドラムの外面側から前記両面感光性記録材料に画像を書き込む第 2 書込手段とを有することを特徴とする画像記録装置。

【請求項 5】 前記第 1 書込手段と前記第 2 書込手段とを前記透明回転ドラムの軸に対して相対的に回転させることにより主走査を行う第 1 走査手段と、
前記第 1 書込手段と前記第 2 書込手段とを前記透明回転ドラムの回転軸方向に相対的に移動させることにより副走査を行う第 2 走査手段とを有することを特徴とする請求項 4 記載の画像記録装置。

【請求項 6】 前記第 2 走査手段が前記透明回転ドラムを該透明回転ドラムの軸方向に移動させるドラム移動手段であることを特徴とする請求項 5 記載の画像記録装置。

【請求項 7】 シート状のベースの両面に感光性カラー画像記録材料を塗布することにより作成される両面感光性記録材料に露光を行うことにより画像記録を行う画像記録装置において、

前記両面感光性記録材料の各面に対して少なくとも 1 つの前記両面感光性記録材料に露光を行う前記両面感光性記録材料に画像情報を書き込む書込手段と書き込み用光源とを有する露光手段と、

該書き込み用光源からの光線を 2 つに分岐する分岐光学系と、
該分岐光学系によって分岐された各光線を前記両面感光性記録材料の各面に導く反射光学系とを有することを特徴とする画像記録装置。

【請求項 8】 前記露光手段がポリゴンミラー又はガルバノミラーを有することを特徴とする請求項 7 記載の画像記録装置。

【請求項 9】 前記両面感光性記録材料の各面毎に異なる階調変換処理を行うことを特徴とする請求項 1 から請求項 8 のいずれか 1 項記載の画像記録装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は画像記録装置に係わり、さらに詳しくは、両面に発色層を有する両面感光性記録材料の両面に画像を高精度で記録する画像記録装置に関する。

【0002】

【従来の技術】

<従来の技術 1>画像記録装置において、アレイ状に配列された発光素子に対して直角方向に片面感光性記録材料を搬送して記録材料に露光する装置が知られている。

【0003】また、<従来の技術 2>画像記録装置において、片面感光性記録材料を回転ドラムに保持し外面側から露光を行う装置、また、片面感光性記録材料をドラムの内面側に保持して回転ミラーを用いて露光を行う装置が知られている。

【0004】さらに<従来の技術 3>画像記録装置において、片面感光性記録材料に対してポリゴンミラー、レゾナントスキャナ、ガルバノスキャナ等を用いて主走査し、直角方向に定速度で搬送して副走査して潜像を形成する装置が知られている。また、両面感光性記録材料にポリゴンミラー等を用いた露光部を両面に独立に設けて潜像を形成する装置が知られている（特開平 4-102629 参照）。

【0005】

【発明が解決しようとする課題】しかしながら、<従来の技術 1 及び 2>では、両面感光性記録材料の両面に画像（潜像）を形成し記録する場合、片面ずつ露光を行う必要があり、処理に要する時間が長くなり、また動作が複雑となる。

【0006】さらに、<従来の技術 3>では両面感光性記録材料の両面に画像（潜像）を形成し記録する場合、感光性記録材料を裏返しにして露光を行う必要があり、不便であり、また、両面感光性記録材料の画像を形成する場合に、各面に別々に露光部を設けているので、大き

いスペースを必要とし装置全体として大きいものとなってしまう。

【0007】本発明は、上記の課題に鑑みなされたもので、両面感光性記録材料に画像情報を小型で高画質で記録する画像記録装置、また、両面感光性記録材料に画像を高画質で記録する画像記録装置、また両面感光性記録材料に画像を低コストで高精度に記録する画像記録装置、さらに、上記の各装置で両面感光性記録材料の両面の濃度階調差を補正できる画像記録装置を提供することを目的としている。

【0008】

【課題を解決するための手段】上記の目的は下記のような手段により達成される。即ち、(A)第1の発明はシート状のベースの両面に感光性カラー画像記録材料を塗布することにより作成される両面感光性記録材料に露光を行うことにより画像記録を行う画像記録装置において、前記両面感光性記録材料の各面に対して少なくとも1つの前記両面感光性記録材料に露光を行う露光手段を設け、該露光手段は前記両面感光性記録材料に画像情報を書き込む書込手段を有し、該書込手段は1列又は複数列のアレイ状の記録素子を有し、オン・オフを行う、又は露光量の制御を行う複数の前記記録素子が、該記録素子に対して配列方向と直角方向に前記両面感光性記録材料に対して相対的に移動する前記両面感光性記録材料にカラー画像を露光記録することを特徴とする画像記録装置であり、(B)第2の発明はシート状のベースの両面に感光性カラー画像記録材料を塗布することにより作成される両面感光性記録材料に露光を行うことにより画像記録を行う画像記録装置において、前記両面感光性材料の各面に対し少なくとも1つの露光手段と、前記両面感光性記録材料を保持する透明回転ドラムとを設け、前記露光手段が前記透明回転ドラム内面側から前記両面感光性記録材料に画像情報を書き込む第1書込手段と、前記透明回転ドラム外面側から前記両面感光性記録材料に画像を書き込む第2書込手段とを有することを特徴とする画像記録装置であり、(C)第3の発明はシート状のベースの両面に感光性カラー画像記録材料を塗布することにより作成される両面感光性記録材料に露光を行うことにより画像記録を行う画像記録装置において、前記両面感光性記録材料の各面に対して少なくとも1つの前記両面感光性記録材料に露光を行う前記両面感光性記録材料に画像情報を書き込む書込手段と書き込み用光源とを有する露光手段と、該書き込み用光源からの光線を2つに分岐する分岐光学系と、該分岐光学系によって分岐された各光線を前記両面感光性記録材料の各面に導く反射光学系とを有することを特徴とする画像記録装置である。

【0009】さらに、請求項9においては、両面感光性記録材料の各面毎に異なる階調変換処理を行うことを特徴とする前記(A)、(B)、(C)項のいずれか1項記載の画像記録装置である。

【0010】

【実施例】以下、第1の発明、第2の発明、及び第3の発明の実施例に係わる画像記録装置を図面に基づいて説明する。

【0011】<第1の発明の実施例>図1は第1の発明の実施例に係わる画像記録装置の概略構成図で、図2は図1の露光手段の概略構成図である。

【0012】両面感光性記録材料にアレイ状に配列した複数の書き込みヘッドで同時に複数色のカラーの画像を書き込む画像記録装置である。ここで、各構成について説明すると、ロール状のカラー印画紙である両面感光性記録材料は例えばロール状両面感光性記録材料83であり、両面感光性記録材料マガジン84はロール状両面感光性記録材料83を収納するマガジンである。カット部11は両面感光性記録材料を所定の長さにかつする機構である。また、露光部には書込手段の赤色用の書き込みヘッド421、緑色用の書き込みヘッド422及び青色用の書き込みヘッド423が隣接して両面感光性記録材料の両面に設けられている。なお、実施例では図2に示すように書込手段の各書き込みヘッドの記録素子は2列に配列されている。また、搬送部はローラ331、332、333、334が設けられて、さらに適所にローラ61が設けられて両面感光性記録材料を搬送する。また、現像処理部20は両面感光性記録材料の潜像を可視化するために現像処理するようになっており、現像処理部20は発色現像槽21で発色現像され、漂白定着槽22で漂白定着され、安定槽23で安定化され、さらに乾燥部24で乾燥される。また、排出トレイ25では現像処理された両面感光性記録材料を外部に排出して保持するようになっている。

【0013】さらに、制御部73は画像記録装置の電気回路ブロックで、この電気回路ブロックでは画像記録装置のシーケンシャルな制御、さらに、外部からの画像電気信号を信号処理して書込手段の書き込みヘッドに信号を送りだしている。前記信号処理として各記録素子のばらつき補正、さらに後述する両面感光性記録材料の階調補正等を行って書き込み信号を書込手段の書き込みヘッド421、422、423に送るようになっている。

【0014】ここで、前述の両面感光性記録材料の階調補正について図3、4で説明すると、図3は両面感光性記録材料の階調補正方法のフローチャート図、図4は両面感光性記録材料の階調補正の説明図である。最初に、書き込みの出力信号に対する両面感光性記録材料の再現濃度関係の目標再現濃度曲線(図4(A)で曲線c)を設定する(F01)。次に、任意の例えば直線のルックアップテーブルを用いてウェッジを露光し、現像してサンプルを作成する(F02)。さらに、前記サンプルの反射濃度を測定し図4(A)の曲線1aを作成する(F03)。なお曲線1aは両面感光性記録材料の一方の面で、曲線1bは両面感光性記録材料の他方の面である。次に、ここでは代表として、曲線1aについて説明す

る。図4の任意の点P1の出力信号値を設定して(F04)、その時の目標再現濃度曲線c上の点P2の目標再現濃度値を求める(F05)。また、目標再現濃度値と同じ濃度に相当する曲線1aの交点P3の濃度を求める(F06)。さらに、点P3の出力信号値(点P4)を求める(F07)。ここで、点P1の出力信号値に点P4の出力信号値を代入して補正する(F08)。同様にして上記のフローチャートF04からF08を繰り返す(F09)。さらに、途中の出力信号値に対しては線型補間、スプライン補間、ベジエ補間等の補間処理を行うことで図4(B)に示すようにルックアップテーブルを作成する(F10)。なお、図4(B)の曲線2aは図4(A)の曲線1aの変換出力信号となっている。同様にして曲線2bは図4(A)の曲線1bの変換出力信号となっている。ここで、補正回路にルックアップテーブルを記憶する(F11)。この記憶されたルックアップテーブルにより階調補正を両面感光性記録材料の両面で行う。なお、階調再現性の差の原因は主に、発色現象処理時の攪拌性の違いによる。以上のような階調補正により両面感光性記録材料の両面が同一の階調特性で再現される。なお、ルックアップテーブルは適当なデータ数があればよく、簡単な線型補間でも良い。また、図4のルックアップテーブルは図7に示す書き込みヘッドにより求めた例である。ルックアップテーブルにより補正すると両面での再現濃度値が ± 0.02 以内の階調再現性が得られる。なお、反射濃度が1.7以上になる場合、実験を通して人が観察を行って濃度差を検知するのが困難であることが判明しており、濃度差が ± 0.02 以内のように正確な再現がされなくとも特に画質の影響はない。また、ルックアップテーブルの作成は例えば、両面で同じシア

ン、マゼンタ、イエローに発色する28段のステップウェッジデータの出力を行い、スキャナで読み込んで自動的に作成することができる。なお、今回の図4は28段のデータを用いたが、例えば15段程度のデータでも支障は無い。また、濃度測定はスキャナを用いたが、サンプリングするデータ間隔を最適化することにより例えば反射濃度計等により1段1段をマニュアル操作で測定してもよい。なお、階調補正は通常の場合、装置のウォーミングが終わった後であれば最初の書き込み操作を行う前に1回行えば特に差が目立たない限り、再度補正を行う必要はない。

【0015】ここで、実施例に用いる両面感光性記録材料は、一般用カラーネガポジシステムで用いられているもので、感光性カラー画像記録材料を塗布し、適当な濃度を有する遮光紙を挟んでベース面を張り合わせたものである。図5に両面感光性記録材料の相対感度図を示し、縦軸は相対対数感度で、横軸は波長を示す。図は青感層、緑感層、赤感層の特性をそれぞれ示す。なお、この両面感光性記録材料は後述の第2の発明、第3の発明の実施例にも使用されるものである。

【0016】ここで、実施例の画像記録装置の作用を説明すると、両面感光性記録材料マガジン84からロール両面感光性記録材料83を引き出し、両面感光性記録材料をカット部11で所定の長さにカットする。さらに、両面感光性記録材料は対向するローラ331,332及びローラ333,334で搬送しながら書込手段の書き込みヘッド421,422,423で外部からの画像電気信号に基づき各種の信号処理を行って複数のアレイ状の記録素子で書き込みを行って潜像を得る。さらに詳しく説明すると、制御回路73では外部から送られてきた画像電気信号は256段階の階調で画像電気信号が図示しない階調変換回路により4096濃度レベルのデータにマッピングされる。書込手段の書き込みヘッドの記録素子の図示しない制御用ドライバで各記録素子の発光時間で表される発光量データに変換され、各記録素子の発光量の平均値を基準値として正規化を行った係数を全段のデータから除算を行い、各記録素子間のばらつきの補正がなされる。なお、ここで露光量の平均値を基準にして正規化することにより補正を行ったが、最小値、最大値は変動が大きいため平均値、また特定の目標値に対して行うのが好ましい。それぞれの感光性記録材料の両方に1対1で同一の入力信号に対して同一露光量になるようなルックアップテーブルを通した後に、両面感光性記録材料に配置された書き込みヘッドが同一の露光強度になるように記録素子間の補正値を設定した後、さらに前述の階調補正を行って前述の書き込みを行う。その後、現像処理部20で両面感光性記録材料は、発色現象槽21で現像し、漂白定着槽22で漂白定着し、安定槽23で安定化してさらに、乾燥部24で乾燥する。その後、外部のトレイ25に排出する。

【0017】次に、第1の発明の他の実施例に係わる画像記録装置について図6で説明する。なお、画像記録装置において上記実施例で説明した装置と同一の部材には同一符号を付すと共に、構成的、機能的に変わらないものについてはその説明を省略する。

【0018】図6は他の実施例に係わる露光手段の概略構成図である。図6(A)は両面感光性記録材料801に書込手段の赤色、緑色、青色の書き込みヘッド407,408,409を配置したものである。露光手段の書き込み用光源、例えば発光ダイオード、電界発光素子等の各色のバックライト488a,488b,488cから出射した光は液晶シャッタ489を介してロッドレンズアレー485を介して両面感光性記録材料801の感光面81、また感光面82に書き込むようになっている。また、図6(B)は両面感光性記録材料801に書込手段の3色の書き込みヘッド424,425,426を配置したもので、書き込み用光源として蛍光表示管を用いている。蛍光表示管481から出射した光をロッドレンズアレー485を介して黄色フィルタ486,青色フィルタ487,赤色フィルタ489を通して両面感光性記録材料801の面に書き込まれるようになっている。なお、このようなアレイを露光手段の書き込み用光源として用いて感光性

記録材料に書き込みを行う場合、それぞれのアレイで記録素子毎の発光量にばらつきがあるため、両面感光性記録材料に再現される濃度に不均一性を生じる問題となるが、事前に測定した発光量データや一度濃度出力を行ったサンプルをマイクロデンストメータやスキャナを用いて走査して得られた各ステップの濃度をもとに目標の階調になるように補正することにより、露光量を各記録素子毎に補正する。なお、厳密な精度をだす場合は、濃度2%以内の誤差であれば見た目には大きな障害にはならないが、なお、好ましくは濃度1%以内に押さえれば更に良い。以上により書込手段の書き込みヘッドで良好な画像を両面感光性記録材料の両面に書き込みできるようになり、さらに露光手段はコンパクトになる。

【0019】さらに、図7は他の実施例に係わる露光手段の概略構成図である。両面感光性記録材料801に書込手段の3色の書き込みヘッド401, 402, 403を配置したもので、露光手段の書き込みヘッド401は赤成分画像記録用で書き込み用光源として主波長660nmのLEDアレイ482と、ロッドレンズアレイ485が組み合わせられている。また、書き込みヘッド402は緑成分画像記録用で、後述する図4のような分光放射エネルギー分布を有する真空蛍光管アレイ484とロッドレンズアレイ485と黄色フィルタ486で構成されている。さらに、書き込みヘッド403は青成分画像記録用で、後述する図4のような分光放射エネルギー分布を有する真空蛍光管アレイ484とロッドレンズアレイ485と色分解用の青色フィルタ487で構成されている。これらの分光エネルギーの選択は両面感光性記録材料の目的とする色以外の分光感度にかからないようなものを用いるのが好ましい。なお、図5で説明したように、カラー印画紙の各発色層ごとに感度が大きく異なるため、緑色の記録素子用としても赤の発色層で潜像形成はしないため、緑色の記録露光用として用いることが可能である。なお、書込手段の書き込みヘッドは同一の場所に向かい合わせに配置するのが空間スペース上で有利であるが、別々の場所に設けても良い(図16を参照)。また、両面感光性記録材料を固定して書き込みヘッドの方を移動して書き込みを行うと搬送時の両面感光性記録材料の搬送方向に対して垂直方向の振動が押さえられ、また、ローラ搬送時のローラと両面感光性記録材料との間の摩擦に伴う滑りなどによる給紙速度の不安定さを防止することができる。また、大きい画像を書き込む場合はアレイ状の書き込みヘッドを数本組み合わせる。

【0020】ここで、図8は真空蛍光管アレイの特性図と色分解補正用フィルタの特性図を示す。上述の書込手段の書き込みヘッドに用いたもので、真空蛍光管アレイの特性図は縦軸は放射エネルギーで、横軸は波長を示し、真空蛍光管アレイ484の特性を示している。また、色分解補正用フィルタの特性図は縦軸はフィルタ透過率で横軸は波長を示し、黄色フィルタ486と青色フィルタ

487の特性を示している。

【0021】<第2の発明の実施例>図9は、第2の発明の実施例に係わる画像記録装置の概略構成図で、図10は図9の露光部の概略構成図である。なお、本実施例において階調補正については第1の発明の実施例と構成的、機能的に同一につき説明を省略する。ここで、各構成について説明すると、両面感光性記録材料801は例えばロール状のカラー印画紙の両面感光性記録材料である。両面感光性記録材料マガジン84は両面感光性記録材料が収納されたマガジンである。また、カット部11は両面感光性記録材料を所定の長さにカットするようになっている。また、露光手段の第1書き込み手段542と第2書込手段541は書き込み用の光源73を共用して書き込みを行うようになっている。光量安定化処理をされた赤、緑、青の各レーザー431, 432, 433からの光は分岐光学系の半透明ミラー511によりビームの約半分を透過、残りを反射することにより2本の光路に分岐される。また、音響変調素子531は光量を変化させて露光量を調節している。前記音響変調素子531では第1の発明の実施例に示したのと同様の方法で、階調補正が行われる。ここで、光量を調整されたそれぞれの光はミラー501、半透明ミラー511により1本の光に合成されて、1つは第1書込手段の反射光学ブロック542で反射して結像レンズ533により集光されて両面感光性記録材料801に露光され、他の1つは第2書き込み手段の反射光学ブロック541で反射して結像レンズ533により集光されて両面感光性記録材料801に露光される。モータ492は歯車498、495を介して透明回転ドラム304を回転する。また透明回転ドラム304は透明の回転ドラムで両面感光性記録材料を保持するようになっている。また、ロータリーエンコーダ490は回転角に応じたパルスを出力し、そのパルスに同期して両面感光性記録材料の正しい位置に露光を行うようになっている。また、搬送部は適所にローラ603が設けられて、両面感光性記録材料を書き込み部、現像処理部へ搬送するようになっている。支持体353は反射光学ブロック541、542を透明回転ドラムの回転方向に対して直角方向に微動部材37により精度良く移動するようになっている。また、現像処理部20は現像処理するようになっており、現像処理部20には発色現像槽21で発色現像され、漂白定着槽22で漂白定着され、安定槽23で安定化され、乾燥部24で乾燥される。排出トレイ25では現像された両面感光性記録材料を外部に排出して保持するようになっている。制御部73は画像記録装置の電気回路ブロックで、外部からの画像電気信号を信号処理して前述した第1の発明の実施例で説明した階調補正等を行って書き込み信号を書き込みヘッドに送るようになっている。

【0022】ここで、実施例の画像記録装置の作用を説明すると、両面感光性記録材料マガジン84から両面感光性記録材料を引き出し、カット部11で所定長さにカット

する。両面感光性記録材料は対向するローラ603で搬送される。両面感光性記録材料は透明回転ドラム304の上に巻きつき固定される。次に、透明回転ドラム304を回転して第1走査手段492により主走査される。また、反射光学ブロックを第2走査手段である微動部材37で移動して副走査し潜像を得る。その後、両面感光性記録材料は透明回転ドラムによりはがされて、適所に設けられたローラ640により現像処理部20に搬送する。現像処理部20で両面感光性記録材料は、発色現像槽21で発色現像し、漂白定着槽22で漂白定着し、安定槽23で安定化し、さらに、乾燥部24で乾燥する。さらに、外部のトレイに排出される。以上により透明回転ドラムに両面感光性記録材料を巻き付けるのでピント面が安定してさらに、副走査の移動速度と音響変調素子の変調速度を調整することで高解像度となる。なお、レーザー光源としてはヘリウムネオンやアルゴンのようなガスレーザーの他に半導体レーザーに半導体レーザーの波長変換素子を組み合わせても良い。書き込み部分で光源を共用することにより、省電力、低コストで高品質の両面記録画像が得られる。なお、第1書込手段、第2書込手段の結像レンズ533は反射光学ブロック541,542の前にあっても良い。なお、第1走査手段の1つの主走査ごとにヘッドを移動、停止しても良いが機械的な工作精度の関係から位置精度を保つことが難しく、このような位置の誤差が濃度むらとして現れることが多いので、露光しながらヘッドを移動するヘリカルスキャン方式を用いるのが好ましい。

【0023】さらに、第2の発明の他の実施例に係わる画像処理装置について説明する。なお、上記実施例で説明した装置と同一の部材には同一符号を付すと共に、構成的、機能的に変わらないものについてはその説明を省略する。

【0024】図11は他の実施例に係わる露光部の概略構成図である。両面感光性記録材料801であるカラー印画紙は、透明回転ドラム303に精度良く巻き付けられ保持される。また、第1書込手段の書き込みヘッド427、第2書込手段の書き込みヘッド428は支持体352に保持され、支持体352は本体10に固定されている。なお、軸受け32は本体10に固定され軸361の軸受けとなっている。また、モータ493は回転にして、歯車496,495を介して透明回転ドラム303が回転するようになっている。なお、ロータリエンコーダ490は歯車495、497を介して回転して、透明回転ドラムの回転位置の検知を行っている。また、ボールネジモータ494は回転してボールねじ34を精密に直線移動させている。このボールねじ34は精密に移動して透明回転ドラムが置かれたテーブル12を透明回転ドラムの軸と平行に移動させる。さらに、制御回路73は画像記録装置の電気回路ブロックで、この電気回路ブロックでは画像記録装置のシーケンシャルな制御、さらに、画像電気信号を信号処理して書き込みヘッドに信号を送りだしている。前記信号処理として各記録素子のば

らつきの補正、さらに前述の両面感光性記録材料の階調補正等を行って書き込み信号を出している。

【0025】ここで、実施例の画像記録装置の作用を説明すると、第1走査手段のモータ493により透明回転ドラム303を回転して3色の書き込みヘッド427、428により主走査を行い、さらに第2走査手段のボールネジモータ494の回転によりボールネジ34によりテーブル12を微動させて副走査して2次元の潜像を得るようになっている。以上により、画像を精度よく記録することができる。

【0026】また、他の実施例に係わる露光部の概略構成について説明すると、図12は他の実施例に係わる露光部の概略構成図で、両面感光性記録材料801のカラー印画紙は透明回転ドラム302に精度よく巻き付けられ保持される。また、モータ491は歯車495,496を介して透明回転ドラム302を回転するようになっている。また、第1書込手段の書き込みヘッド417、第2書込手段の書き込みヘッド418は支持体351に保持されている。この支持体351はモータの回転により透明回転ドラム302の軸362に平行に精密移動するようになっている。なお、軸受け32は本体10に固定され軸362の軸受けとなっている。

【0027】ここで実施例の画像記録装置の作用を説明すると、図11で説明したと同様に、書き込みヘッド418、417と透明回転ドラム302とを相対的に回転して主走査し、また、支持体の移動で副走査を行い2次元の画像を得る。以上により精度よく記録することができる。

【0028】さらに、他の実施例に係わる露光部の概略構成について説明すると、図13は他の実施例に係わる露光部の概略構成図で、書き込みヘッド412は両面感光性記録材料の感光面81に書き込み、他方の書き込みヘッド411は両面感光性記録材料の感光面82に書き込むようにしている。第2書込手段の書き込みヘッド412はLED発光素子471でブルー色、グリーン色の光線を、またLED発光素子472でレッド色の光線を出すようになっている。また、それぞれの光線をレンズ461で感光面に結像させる。第1書込手段の書き込みヘッド411についても同様に付き、同一符号を付け説明は省略する。各書き込みヘッドは所定の位置に精度よく取り付けられ、両面感光性記録材料801を透明回転ドラム301の内側面、外側面よりそれぞれ書き込みヘッドにより3色を同時に書き込むようになっている。書き込みヘッド411、412と透明回転ドラム301とを第1走査手段で相対的に回転して主走査し、また透明回転ドラム301と書き込みヘッド411、412とを透明回転ドラム301の軸方向に第2走査手段で相対移動して副走査を行い2次元の画像を得る。以上により両面感光性記録材料301が透明回転ドラムに巻きつき、両面感光性記録材料のピント面が安定して潜像を形成することができる。

【0029】このような光学系を用いて、両面感光性記録材料の濃度差を±0.02以下にすることが可能で、鮮鋭

性の補正を両面感光性記録材料の両面でそれぞれの露光手段で変更することにより透明体に密着させる側が透明体での散乱などにより鮮鋭性が劣化することを補正できる。なお、書き込みユニットとして、ヘリウムネオン、アルゴンや半導体などのレーザーによる光源で露光を行うと、ピッチを細かくすることができ高画質な画像が得られる。

【0030】<第3の発明の実施例>図14は第3の発明の実施例に係わる画像記録装置の概略構成図である。なお、本実施例において、現像処理部は図1と構成的に同一に付き説明は省略する。階調補正については第1の発明の実施例と構成的、機能的に同一につき説明を省略する。

【0031】ここで、各構成を説明すると、露光手段の書き込み用光源の半導体レーザー431から出射したレーザー光は、書込手段のビームエキスパンダ58を介してモータ445で回転されるポリゴンミラー441で偏光される。この偏光の前半の等角速度の平行光束は $f\theta$ レンズ571とミラー502を介して等線速度の集束スポット光となり主走査し両面感光性記録材料801の一方の面に書き込まれるようになっている。同様にしてポリゴンミラー441で偏光された後半の等角速度の平行光束は $f\theta$ レンズ572とミラー503を介して等線速度の集束スポット光となり主走査して両面感光性記録材料の他方の面に書き込まれるようになっている。また、両面感光性記録材料801はローラ601,602により搬送され副走査される。

【0032】ここで、実施例の作用について説明すると、両面感光性記録材料801はローラ601,602で書き込み部へ搬送され、ここで、両面感光性記録材料801の両面に書き込み用光源からの光線を2つに分岐して、書込手段により書き込みが同時に行われる。前記書込手段は1つの半導体レーザー431から出射したレーザー光が、ビームエキスパンダ58を介してモータ445で回転される。ポリゴンミラー441で偏光され、偏光の前半の等角速度の平行光束は $f\theta$ レンズ571と反射光学系のミラー502を介して等線速度の集束スポット光となり主走査し両面感光性記録材料801の一方の面に書き込まれる。また、同様にしてポリゴンミラー441で偏光された後半の等角速度の平行光束は $f\theta$ レンズ572とミラー503を介して等線速度の集束スポット光となり主走査して両面感光性記録材料801の他方の面に書き込まれる。また、両面感光性記録材料801はローラ601,602により搬送され副走査して2次元の画像を得る。その後、両面感光性記録材料は前述の図1のように現像処理部で現像処理されることにより可視化され外部に排出される。なお、 $f\theta$ レンズ571,572と反射光学系のミラー502,503を1組にしても良い。また、ヘリウムネオン、アルゴン半導体などのレーザーによる光源で書き込むとピッチを細かくすることができ、鮮鋭性や解像度の面で高画質なものとなる。以上のように、2組の書込手段は大部分が共用しており、小型

化、低コスト化がはかれる。

【0033】さらに、第3の発明の他の実施例に係わる画像記録装置について説明する。なお、上記実施例で説明した装置と同一の部材には同一符号を付すと共に、構成的、機能的に変わらないものについてはその説明を省略する。

【0034】図15は他の実施例に係わる露光部の概略構成図である。ここで、各構成についてを説明すると、書き込み用光源のグリーン色の半導体レーザー434からの光はレンズ463,ミラー504をへて、また、ブルー色の半導体レーザー435の光はレンズ463,半透明ミラー513をへて、さらに、レッド色の半導体レーザー436の光はレンズ463,半透明ミラー513をへてそれぞれガルバノミラー451に照射する用になっている。また、ガルバノミラー451は合成した光を偏光して主走査する。主走査の前半は $f\theta$ レンズ573を通して反射光学系のミラー522で反射して両面感光性記録材料801の一方の面に書込手段により書き込む。また、主走査の後半は $f\theta$ レンズ573を通し、反射光学系のミラー521で反射して両面感光性記録材料801の他方の面に書込手段により書き込まれるようになっている。

【0035】ここで、実施例の装置の作用を説明すると、書き込み用光源のグリーン色の半導体レーザー434からの光はレンズ463,ミラー504をへて、またブルー色の半導体レーザー435の光はレンズ463,半透明ミラー513をへて、さらに、レッド色の半導体レーザー436の光はレンズ463,半透明ミラー513をへて3色に合成されてガルバノミラー451に照射する。ガルバノミラー451では偏光し主走査される。主走査の前半は $f\theta$ レンズ573を通してミラー522で反射して両面感光性記録材料801の一方の面に書き込まれる。また、主走査の後半は $f\theta$ レンズ573を通しミラー521で反射して両面感光性記録材料801の他方の面に主走査して書き込まれる。さらに、両面感光性記録材料801は図面の紙面に対し前後方向に搬送して副走査して2次元の画像を得る。なお、グリーン、ブルーの半導体レーザーは波長変換素子と組み合わせても可能である。以上のとうにして、書込手段の大部分を共用しており、小型化、低コスト化がはかれる。

【0036】なお、偏向レンズ系の色収差の面から起こる各位置調整を行う手段を設けるか、特別な色消し光学系を用いることにより誤差を防止できる。

【0037】また、感光性記録材料の遮光性は反対の面が感光されない限り薄くすることが可能であるが、遮光性により反対の面で亜潜像が形成され、そのままでは反対面では予測される露光量が増すため予想した濃度より濃い方向に濃度再現が行われる場合があり、このような場合は強露光を行った反対面の点の露光量を増した露光量の分、予想して減らす方向で制限することで、濃く濃度再現される現象を補正することが可能である。なお、第1の発明、第2の発明についてもいえる。

【0038】なお、第1の発明、第2の発明の実施例において、大きいサイズ等に書き込む装置にあっては複数の書き込みヘッドをつなぎ合わせる時に、オーバーラップさせると書き込む隙間が発生しなくなる。

【0039】さらに、第1の発明の他の実施例に係わる画像記録装置について、さらに説明すると、図16は他の実施例に係わる画像記録装置の概略構成図で、両面感光性記録材料801は両面感光性記録材料マガジン84より引き出し、ローラ603で搬送してドラム605近くに設けた書込手段の3色の書き込みヘッド415で書き込む。両面感光性記録材料はさらに搬送され、書き込みヘッド416で感光性記録材料の他方の面に書き込まれる。なお、2つの書き込みヘッドの開始時期は適時調節して両面の書き込み位置を所望の位置に合わせる。その後、両面感光性記録材料はローラ604で搬送されて、現像処理部20に入る。現像処理部20では発色現像槽21で発色現像され、漂白定着槽22で漂白定着され、安定槽23で安定化され、乾燥部24で乾燥されてトレイに排出される。以上により同時に両面感光性記録材料に画像が記録される。

【0040】

【発明の効果】以上のように構成したので下記のような効果を奏する。

【0041】第1の発明の画像記録装置によれば、各面に対して少なくとも1つの露光手段を設けたので、一面の露光終了後、両面感光性記録材料を反転操作して、さらにもう一面の露光を行う必要がなく、小さな装置で簡素に短時間で両面画像記録を得ることができる。また、1面毎に1色に対して1本有したので感光性記録材料の特性に合わせて各色ごとに記録素子を選択でき、迅速な処理ができる。また、感光性記録材料に対して最適な分光エネルギー分布の書き込み用光源により高速に画像を記録することが可能である。

【0042】また、第2の発明の画像記録装置によれば、位置精度が良く、解像力の面で高画質が得られる透明回転ドラムにより、両面同時記録ができ、短時間で両面画像記録ができる。また、透明回転ドラムと書き込み手段を相対的に回転して主走査し、さらに軸方向に相対移動して副走査するので、装置の移動負荷を小さくすることができ、さらに画質が安定する。また、透明回転ドラムを軸方向に移動して副走査させるので、装置の移動負荷を小さくすることができ、さらに、書込手段による振動の影響のない高画質な画像が得られる。

【0043】また、第3の発明の画像記録装置によれば、1つの書き込み用光源を分岐するので、コストダウンがはかれ、消費電力の小さい、小型な装置が得られる。また、ポリゴンミラー、ガルバノミラーを有するので、簡単な方法で高解像度な両面画像が短時間で得られ、しかも低コストとなる。

【0044】さらに、以上の第1の発明、第2の発明、第3の発明で異なる階調変換処理により両面での差異を

補正するので両面で同じ階調特性を有した出力画像が得られる。例えば、現像での両面での現像差を補正できる。

【図面の簡単な説明】

【図1】第1の発明の実施例に係わる画像記録装置の概略構成図である。

【図2】図1の露光手段の概略構成図である。

【図3】図3は両面感光性記録材料の階調補正方法のフローチャート図である。

【図4】図4は両面感光性記録材料の階調補正の説明図である。

【図5】カラー印画紙の相対感度図である。

【図6】他の実施例に係わる露光手段の概略構成図である。

【図7】他の実施例に係わる露光手段の概略構成図である。

【図8】真空蛍光管アレイの特性図と色分解補正用フィルタの特性図である。

【図9】第2の発明の実施例に係わる画像記録装置の概略構成図である。

【図10】図9の露光部の概略構成図である。

【図11】他の実施例に係わる露光部の概略構成図である。

【図12】他の実施例に係わる露光部の概略構成図である。

【図13】他の実施例に係わる露光部の概略構成図である。

【図14】第3の発明の実施例に係わる画像記録装置の概略構成図である。

【図15】他の実施例に係わる露光部の概略構成図である。

【図16】他の実施例に係わる画像記録装置の概略構成図である。

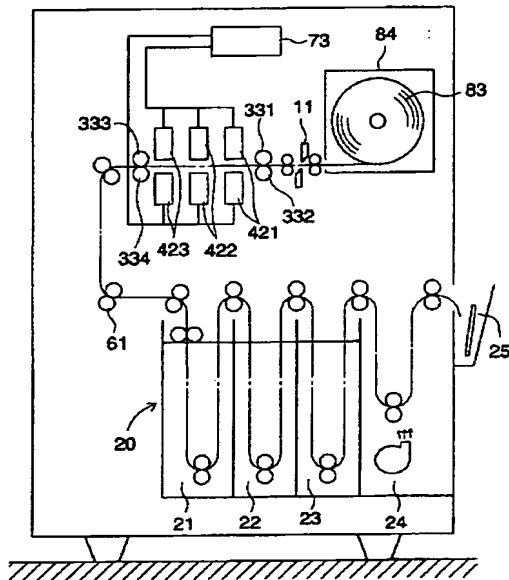
【符号の説明】

- 10 本体
- 11 カッタ部
- 12 テーブル
- 20 現像処理部
- 21 発色現像槽
- 22 漂白定着槽
- 23 安定槽
- 24 乾燥部
- 25 トレイ
- 302, 303, 304 透明回転ドラム
- 32 軸受け
- 331, 332, 333, 334 ローラ
- 34 ボールネジ
- 351, 352, 353 支持体
- 361, 362 軸
- 37 微動部材

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- 401, 402, 403, 407, 408, 409 書き込みヘッド
- 411, 412, 415, 416, 417, 418 書き込みヘッド
- 421, 422, 423, 424, 425, 426, 427, 428 書き込みヘッド
- 431, 432, 433, 434, 435, 436 半導体レーザ
- 441 ポリゴンミラー
- 445 モータ
- 451 ガルバノミラー
- 461, 463 レンズ
- 471, 472 発光素子
- 481 蛍光表示管
- 482 LED アレイ
- 484 真空蛍光管アレイ
- 485 ロッドレンズアレイ
- 486 黄色フィルタ
- 487 青色フィルタ
- 488a, 488b, 488c バックライト
- 489 液晶シャッタ
- 490 ロータリーエンコーダ
- 491, 492, 493 モータ

【図 1】

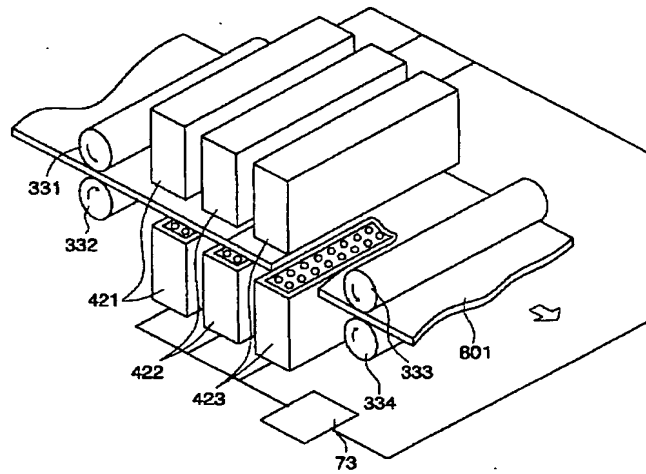


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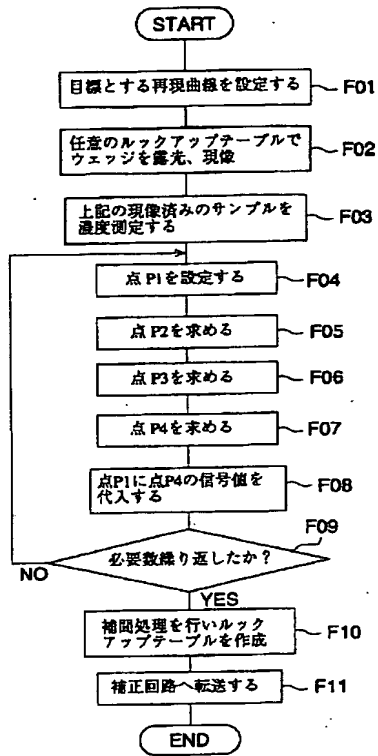
- * 494 ボールネジモータ
- 495, 496, 497, 498 歯車
- 499 赤フィルタ
- 501, 502, 503, 504 ミラー
- 511, 513 半透明ミラー
- 521, 522 ミラー
- 531 音響変調素子
- 533 結像レンズ
- 541, 542 反射光学ブロック
- 10 571, 572, 573 f θ レンズ
- 58 ビームエキスパンダ
- 601, 602, 603, 604, 605, 606 ローラ
- 61, 63 ローラ
- 73 制御回路
- 801 両面感光性記録材料
- 81, 82 感光面
- 83 ロール状両面感光性記録材料
- 84 両面感光性記録材料マガジン

*

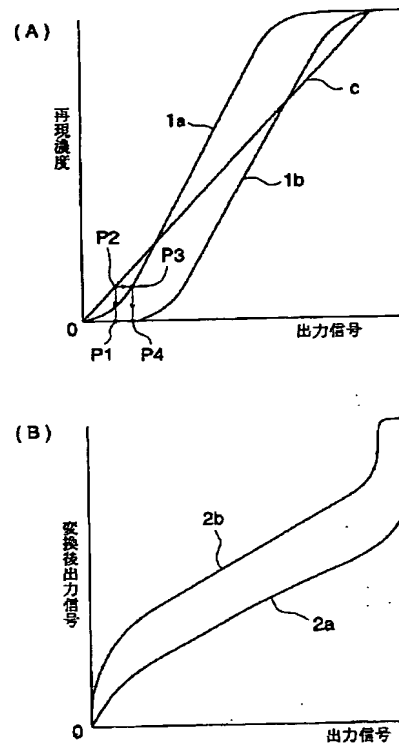
【図 2】



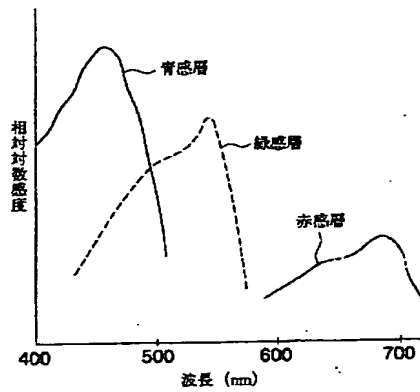
【図 3】



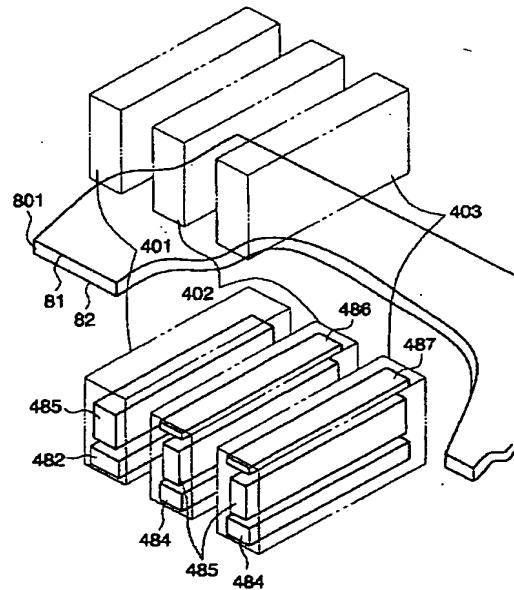
【図 4】



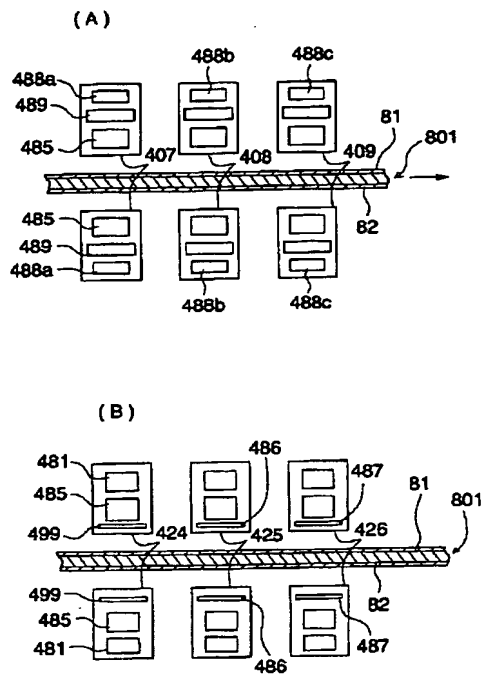
【図 5】



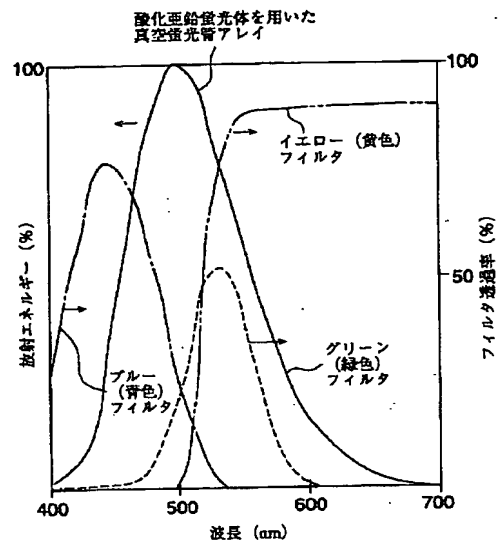
【図 7】



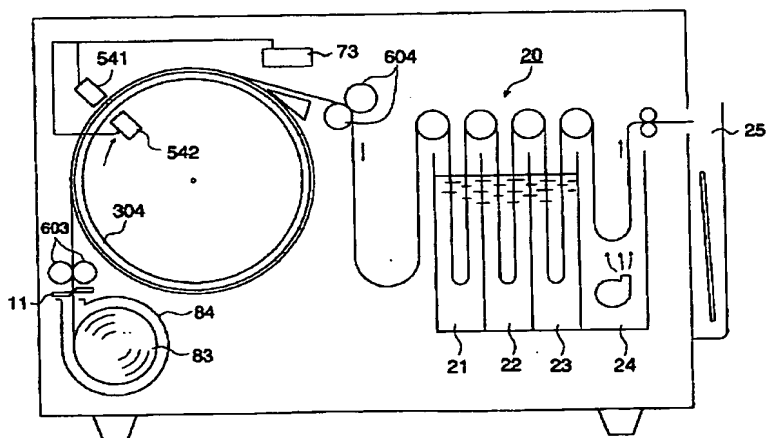
【図6】



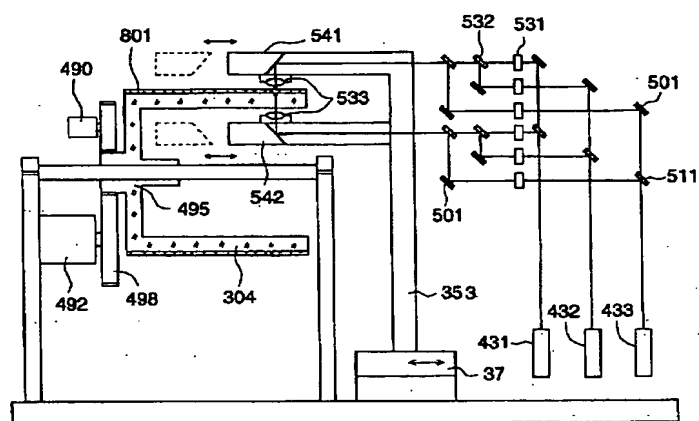
【図8】



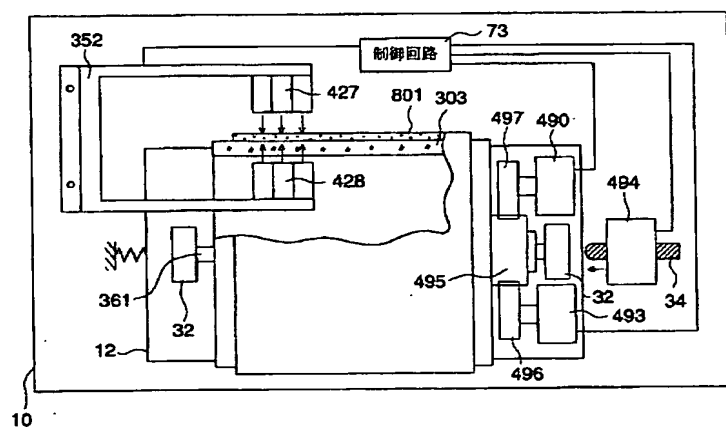
【図9】



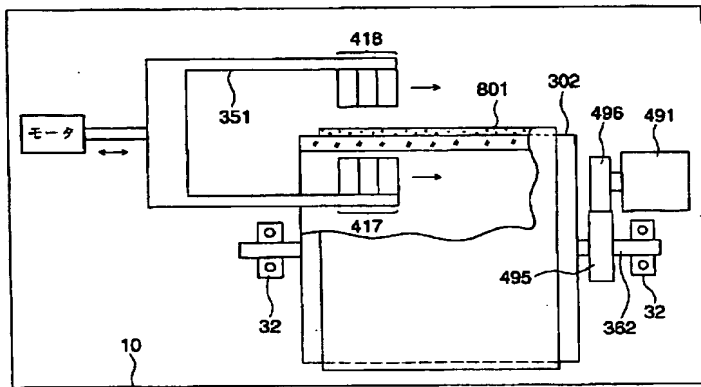
【図10】



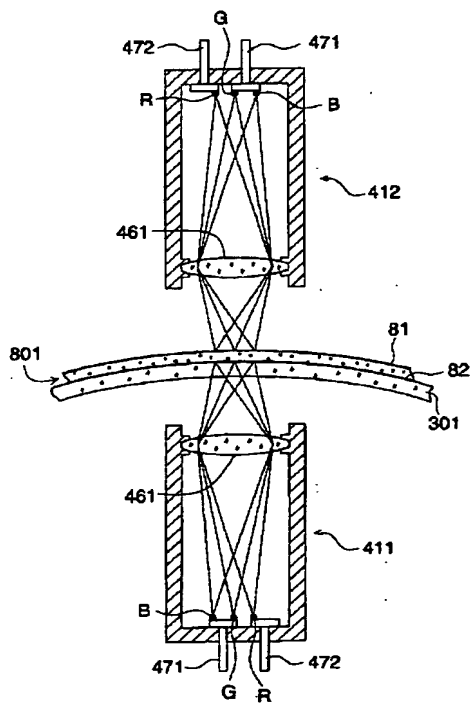
【図11】



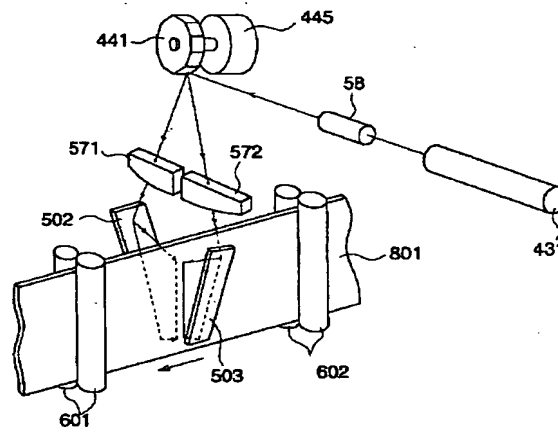
【図 12】



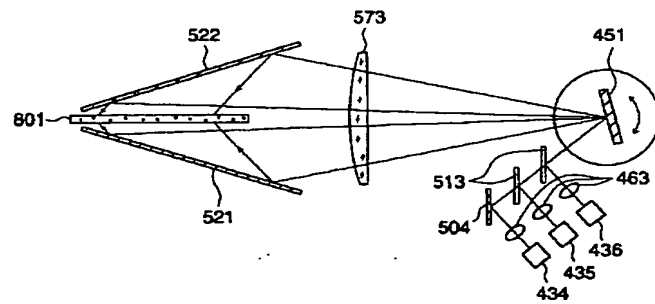
【図 13】



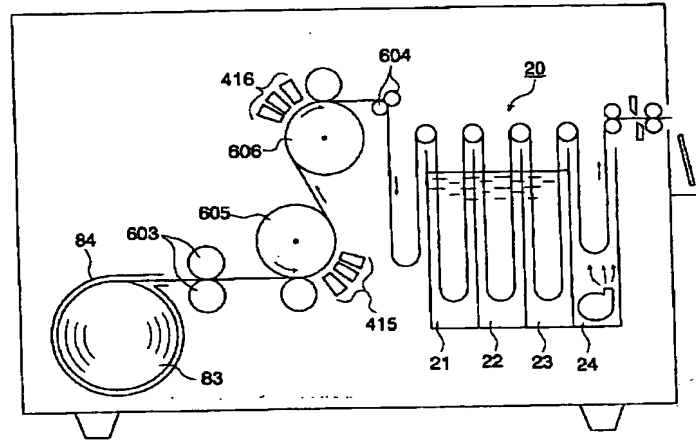
【図 14】



【図 15】



【図 16】



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